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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/788,700

Applicant(s)

SREENIVASAN, SIDLGATA V.

Examiner

Matthew J. Daniels

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 June 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Replacement drawings were received on 19 June 2007. These drawings are accepted. It is noted that the drawings denote "Related Art", however, the description on page 7 of the remarks states that this is a Prior Art legend.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1, 3, 5, 8, 9, 10, 13, 15, 16, 19** are rejected under 35 U.S.C. 102(b) as being anticipated by Colburn (Doctor of Philosophy dissertation, University of Texas at Austin, 2001).

As to Claim 1, Colburn teaches a method, which is used or could be used in an imprint lithography system, for forming a layer on a substrate (page 22, Fig. 2.1, (4)), the method comprising:

Forming a plurality of flowable regions on a substrate (page 55, section 3.4);

Contacting the flowable regions with a plurality of molds disposed on a template (pages 55-58); and

Solidifying the plurality of flowable regions (page 22, Fig. 2.1).

As to **Claim 3**, by providing material as droplets that do not immediately coalesce, the flowable regions of Colburn would inherently confine the material associated with each of the flowable regions to an area. As to **Claim 5**, Colburn solidifies by applying UV light (page 22). As to **Claim 8**, the flowable regions of Colburn are inherently spaced apart (pages 55-58).

As to **Claim 9**, Colburn teaches a method, which is used or could be used in an imprint lithography system, of forming a layer on a substrate (Fig. 2.1, page 22, (4)), the method comprising:

Forming a plurality of flowable regions on an imprint lithography substrate (page 55, section 3.4);

Providing each of the plurality of flowable regions with a surface having a desired shape (the mold of Colburn contacts all droplets, giving all flowable regions a surface having a desired shape); and

Solidifying the plurality of flowable regions (page 22, Fig. 2.1, UV light).

As to **Claim 10**, Colburn contacts the plurality of flowable regions (pages 55-58) with a plurality of molds (page 22, Fig. 2.1, (1-A) to (3)). As to **Claim 13**, Colburn solidifies by applying UV light (page 22). As to **Claim 15**, the capillary effect between the flowable liquid and the mold would inherently confine the material to an area. For example, see Fig. 3.1, page 40, and Fig. 3.3, page 44, which shows the material does not wet the substrate, but is wicked into a gap with the template by capillary action.

As to **Claim 16**, Colburn teaches a method for forming a layer on a substrate (page 22, (4)), the method comprising:

Forming a plurality of flowable regions on a substrate (page 55, section 3.4);

Contacting the flowable regions with a plurality of imprint lithography molds disposed on a template (page 22, Fig. 2.1, (1-A), each projection is a mold); and

Solidifying the plurality of flowable regions (page 22, Fig. 2.1, UV light).

Although Colburn does not explicitly teach that the material is spread while confining the material, the capillary effect between the flowable liquid and the mold would inherently confine the material to an area. For example, see Fig. 3.1, page 40, and Fig. 3.3, page 44, which shows the material does not wet the substrate, but is wicked into or held in a gap with the template by capillary action. Thus, in the method of Colburn the material is confined to regions having a capillary effect.

As to Claim 19, Colburn solidifies by applying UV light (page 22).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 2, 4, 6, 7, 11, 12, 14, 17, 18, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Colburn (Doctor of Philosophy dissertation, University of Texas at Austin, 2001). Colburn teaches the subject matter of 1, 9, 10, and 16 above under 35 USC 102(b). **As to Claims 2, 7, 11, and 17**, although silent to the particular droplet number or placement claimed, Colburn teaches that it is known that several patterns of fluid placement are preferable to a single

droplet located at the center of the template, and further that the fluid delivery pattern affects both the imprint uniformity and process time. Thus, Colburn teaches that the particular pattern of fluid placement and fluid delivery pattern are result effective variables that are optimizable by the ordinary artisan. The subject matter of these claims would have been prima facie obvious as optimizable designs, patterns, or fluid delivery patterns which affect the uniformity, process time, and imprint pressure. **As to Claims 4, 6, 12, 14, 18, and 20**, although silent to “flexing” of the mold or template, Colburn teaches that non-symmetric pressure is applied to the template which results in touching of the template to the mold. Non-symmetric pressure applied to a template would cause some amount of flexing of the entire template, also resulting in touching or conforming to the substrate, which reads on the subject matter of these claims.

4. **Claims 21-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Colburn (Doctor of Philosophy dissertation, University of Texas at Austin, 2001) in view of Everhart (USPN 6048623). Colburn teaches the subject matter of 1, 9, and 16 above under 35 USC 102(b). **As to Claims 21-23**, although Colburn appears to be silent to the step that the substrate is populated by a plurality of physically separated imprinted layers corresponding to the plurality of flowable regions, Everhart teaches that it is known to provide imprint material and stamping, forming imprinted material onto the surface of a gold film (4:33-65). Therefore, Everhart teaches a process wherein subsequent to a solidifying step, the substrate is populated by a plurality of physically separated imprinted layers corresponding to the plurality of stamped, flowable regions. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Everhart into that of Colburn because Everhart

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teaches a stamper and process which is applicable to the stamp and process of Colburn as lithographic methods. One of ordinary skill in the art would have recognized that applying the Everhart technique to that of Colburn would provide the expected results (1) that the imprinted surface area would be reduced, reducing the required pressure, and (2) that the imprinted pattern would be defined by the projecting portions of the template instead of the recesses of the template.

5. **Claims 1-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Howell (USPN 1236304) in view of Nemoto (USPN 3781214). **As to Claim 1**, Howell teaches a method for forming a layer on a substrate (printing is a layer), the method comprising:

Forming a plurality of regions on a substrate (marking material is applied to a substrate, forming the regions);

Contacting the regions with a plurality of molds disposed on a template (10); and

Solidifying the plurality of regions (the marking inherently solidifies in order that it used as a printed article).

Howell is silent to the marking being "flowable", however, it is well known to use flowable ink as a marking ink. One example is Nemoto (columns 1 and 2, in particular 1:25-27), who suggests the material for use with letter press printing (2:15), which is the method used by Howell. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Nemoto into that of Howell, the method including an ink that is flowable and application of uv-light to cure, which would desirably provide an indicia to a surface, eliminate the extra labor, materials, and waiting time which are usually required do

to the slow drying speed of known printing inks in letter press printing, which would remarkably accelerate printing speed (see Nemoto, 2:11-17), which would be desirable to Howell.

Although silent to the particular order of steps of first forming flowable regions on the surface *and then* contacting said flowable regions with a plurality of molds, this is asserted to be a difference or rearrangement in the order of steps which is generally unpatentable in the absence of unexpected results.

As to Claim 2, the number of flowable regions applied by Howell is the same as the number of molds (an integer multiple of 1). **As to Claim 3**, the material (ink, see Nemoto) flows and is implicitly confined by the letters or type, because in the alternative, the letters could not be individually resolved. **As to Claim 4**, the template upon which the molds are disposed is flexed in order to conform to the substrate (items 9, 10 in Figs. 1 and 3). **As to Claim 5**, Nemoto provides uv-activated ink and uv-curing (2:11-33). **As to Claim 6**, Howell flexes the template at a region between adjacent molds during the printing process (Fig. 1). **As to Claim 7**, this limitation appears to be drawn only to the order of process steps, which is generally deemed to be unpatentable in the absence of unexpected results. However, Howell also forms the flowable regions concurrently using the type (Fig. 1). **As to Claim 8**, in the method of Howell, each of the regions is spaced apart from adjacent regions (implicit in forming type or print).

As to Claim 9, Howell teaches a method of forming a layer on a substrate, the method comprising:

Forming a plurality of regions on a substrate (marking is applied to a substrate, forming the regions);

Providing each of the plurality of regions with a surface having a desired shape (the type or character, item 10, is a mold or template having a shape and outline of a letter); and

Solidifying the plurality of regions (the marking inherently solidifies in order that it used as a printed article).

Howell is silent to the marking being "flowable", however, it is well known to use flowable ink as a marking ink. One example is Nemoto (columns 1 and 2, in particular 1:25-27), who suggests the material for use with letter press printing (2:15), which is the method used by Howell. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Nemoto into that of Howell, the method including an ink that is flowable and application of uv-light to cure, which would desirably provide an indicia to a surface, eliminate the extra labor, materials, and waiting time which are usually required do to the slow drying speed of known printing inks in letter press printing, which would remarkably accelerate printing speed (see Nemoto, 2:11-17), which would be desirable to Howell.

Although silent to the particular order of steps of first forming flowable regions on the surface *and then* providing each of the flowable regions with a surface having a desired shape, this is asserted to be a difference or rearrangement in the order of steps which is generally unpatentable in the absence of unexpected results. **As to Claim 10**, Howell provides molds disposed on a template which contact the regions (Fig. 4, item 25). **As to Claim 11**, the number of marking regions applied by Howell is the same as the number of molds (an integer multiple of 1). **As to Claim 12**, the template upon which the molds are disposed is flexed in order to conform to the substrate (see item 10 in Fig. 1). **As to Claim 13**, Nemoto provides uv-activated ink and uv-curing (2:11-33). **As to Claim 14**, Howell flexes the template at a region between

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adjacent molds during the printing process (Fig. 1). **As to Claim 15**, the material (marking material) would implicitly flow and be confined by the letters or type, because in the alternative, the letters could not be individually resolved.

As to Claim 16, Howell teaches a method for forming a layer on a substrate (printed ink is a layer), the method comprising:

Forming a plurality of regions on a substrate (marking material is applied to a substrate, forming the regions);

Spreading the material of the regions over the substrate while confining the material associated with each of the plurality of regions to an area (the material is implicitly confined in order to maintain the shape of the type to be reproduced);

Contacting the regions with a plurality of molds disposed on a template (the type or character, 10, is a mold or template); and

Solidifying the plurality of regions (the marking material inherently solidifies in order that it used as a printed article).

Howell is silent to the marking being "flowable", however, it is well known to use flowable ink as a marking ink. One example is Nemoto (columns 1 and 2, in particular 1:25-27), who suggests the material for use with letter press printing (2:15), which is the method used by Howell. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Nemoto into that of Howell, the method including an ink that is flowable and application of uv-light to cure, which would desirably provide an indicia to a surface, eliminate the extra labor, materials, and waiting time which are usually required do

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to the slow drying speed of known printing inks in letter press printing, which would remarkably accelerate printing speed (see Nemoto, 2:11-17), which would be desirable to Howell.

Although silent to the particular order of steps of first forming flowable regions on the surface *and then* contacting said flowable regions with a plurality of molds, this is asserted to be a difference or rearrangement in the order of steps which is generally unpatentable in the absence of unexpected results. **As to Claim 17**, the number of flowable regions applied by Howell is the same as the number of molds (an integer multiple of 1). **As to Claim 18**, the template upon which the molds are disposed is flexed in order to conform to the substrate (see Fig. 1). **As to Claim 19**, Nemoto provides uv-activated ink and uv-curing (2:11-33). **As to Claim 20**, Howell flexes the template at a region between adjacent molds during the printing process (Fig. 1). **As to Claims 21-23**, in the process of Howell, it is submitted that printing would occur only at the lettered parts (Fig. 2), and therefore after a solidifying step the substrate would be populated by a plurality of physically separated imprinted layers corresponding to the plurality of flowable regions.

Response to Arguments

6. Applicant's arguments filed 19 June 2007 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

- a) Colburn does not teach a plurality of molds. The rigid template of Colburn would relate to merely one of the molds described in the present application.
- b) Howell and Nemoto are not directed to nano-imprint lithography, and the claims are now amended to recite a method utilized within a nano-imprint lithography system.

7. These arguments are not persuasive for the following reasons:

- a) In the Colburn method, the imprinted material below each projection takes the shape of the projection (mold), and therefore the claimed subject matter is still anticipated. Claims 21-23 now recite an additional limitation that the substrate is populated by a plurality of physically separated layers corresponding to the flowable regions. The presentation of these dependent claims indicates that the independent claims should be interpreted as more broad, such that the claimed subject matter of Claims 1, 9, and 16 would include embodiments wherein the plurality of imprinted layers are not physically separated. This is what is shown by Colburn. If this is not the case, it is unclear how claims 21-23 are further limiting as required by 37 CFR 1.75(c) because they would recite only that which is already present in the independent claims.
- b) Applicants' remarks state "nano-imprint" lithography, but the claims state "imprint lithography". This argument is not commensurate with the scope of the claims if the particular size argued is intended to be relied upon in interpreting the claims. The Howell and Nemoto methods are interpreted to provide an imprint lithography process which reads on the claimed subject matter.

The prefix "nano" may imply some degree of size, but it is noted that any dimension may also be expressed in nanometers.

Additionally, the new limitations to an imprint lithography process are drawn to an intended use, and it is submitted that the Howell/Nemoto process fulfills the intended use.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

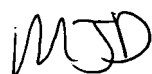
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJD 9/11/07



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